AMENDMENTS TO THE SPECIFICATION

Please replace Paragraphs [0006], [0007], [0008], [0010], [0025] and [0027] with the following paragraphs rewritten in amendment format:

[0006] In view of the foregoing, it would be highly desirable to provide a polymer composite structure having a matrix interlayer which provides the superelastic properties of a SMA, but which does not significantly add to the weight of the overall structure, and also which does not negatively ~~e~~affect the hot-wet compression strength of the matrix interlayer.

[0007] The present invention is directed to a polymer composite structure having an interlayer which is reinforced with shape memory alloy (SMA) particles. The use of SMA particles in the interlayer significantly enhances the damage resistance and damage tolerance (e.g. compression-after-impact (CAI) strength) of the interlayer without negatively ~~e~~affecting its hot-wet compression strength.

[0008] In one preferred form the polymer composite structure comprises titanium-nickel alloy particles, and more preferably particles formed from Nitinol® alloy. The titanium-nickel alloy particles have superelastic, reversible strain properties similar to elastomeric or polymeric thermoplastic particles more traditionally utilized in the interlayer of a polymer composite structure, but do not negatively affect the hot-wet compression strength of the interlayer. The result is a polymer composite material having an interlayer which is able to even more effectively absorb impact stresses, thereby toughening the composite material[[,]] without negatively ~~e~~affecting its hot-wet compression strength.

[0010] In one preferred embodiment all of the distinct resin interlayers include SMA particles in an austenitic phase. In an alternative preferred embodiment a plurality of distinct matrix interlayers are provided in a polymer composite structure. At least one of the interlayers includes SMA particles provided in an austenitic phase and at least one interlayer includes SMA particles provided in a martensitic phase at the same temperature, depending on the intrinsic transformation temperature of the SMA particles.

[0025] Still another significant advantage of the SMA particles 20 is that they do not tangibly increase the overall weight of the composite structure 10 due to the resultant gains in overall strength of the composite under hot/wet conditions which typically limit the performance envelope for polymer composite structures. Again, this is particularly important in aerospace applications where lightweight, yet structurally strong components are highly important. Moreover, the use of SMA particles 20 in the matrix interlayer does not require significant modification to existing composite part fabrication processes where composite structures are formed using prepreg materials and are easily incorporated into advanced composite part fabrication processes not involving preimpregnated material forms (e.g. resin transfer molding (RTM), vacuum assisted resin transfer molded [(VARJM)] (VARTM), resin infusion, etc).

[0027] The use of Nitinol® alloy as the SMA material provides significant resistance to impact damage of the composite structure 10. This is because Nitinol® alloy is capable of absorbing a significant degree of impact and deformation due to its high elongation properties. Nitinol® alloy provides reversible, strain

properties of up to 8-10% strain without permanent deformation (or strain offset) when in its austenitic phase. This provides significant load-velocity impact resistance. Nitinol® alloy also provides a non-reversible strain property enabling up to 20-25% elongation-to-failure[[,]] for high velocity impact resistance. Nitinol® alloy also has significant vibration dampening properties while in the martensitic state that help to improve the fatigue life of the composite structure 10, which is an especially desirable characteristic for aircraft and spacecraft structures.